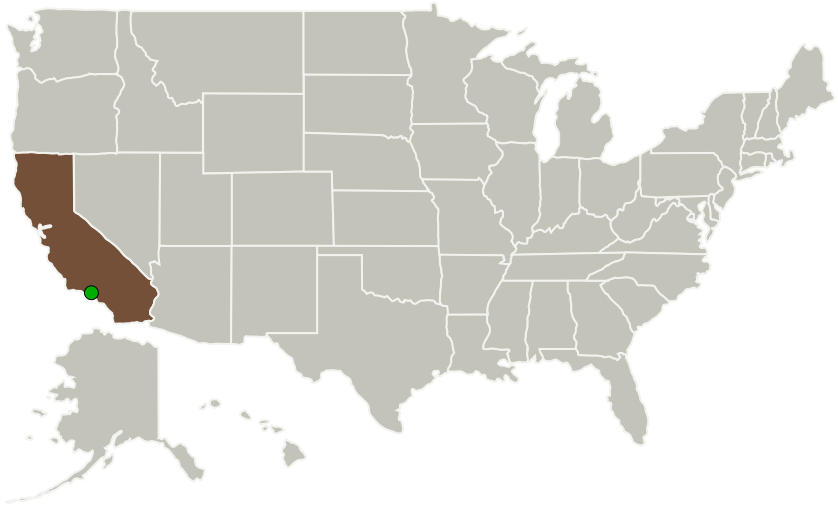
# New Approach to Science Data Discovery in Petascale Systems, Phase I

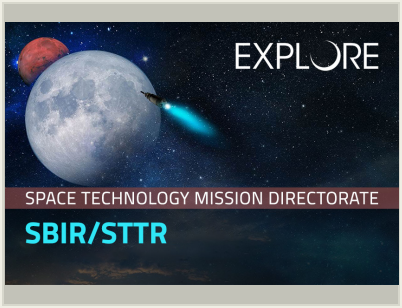
Completed Technology Project (2011 - 2011)

## Project Introduction

With the information age has come a dramatic increase in our ability to generate and collect data while the traditional techniques to analyze this tsunami of data have proven woefully inadequate. The amount of data collected and stored electronically is doubling every three years. Many researchers are simply overwhelmed by the amount of data. Scientific visualization remains the dominant form of data exploration but current tools are focused on image creation and lack the much needed embedded analysis capabilities. To address this urgent need, we propose to develop and introduce a first-of-its kind tool kit called SciViz2. SciViz2 brings together key innovations in three separate fields of scientific visualization, data mining, and computer vision to offer an integrated solution for physics mining of the most complex of data sets; multi-dimensional, multi-variate data sets. SciViz2 bridges the existing gap in software technology by providing a scalable knowledge discovery tool that combines the power of machine learning techniques with scientific visualization. Our Phase I goal is to develop a prototype and demonstrate the viability of the solution by applying it to one of the most challenging data analysis problem, that is the data from peta-scale particle simulations. The underlying physics involves complex interaction of multi-variates and the output involves both grid-based and particle phase space data with nearly trillion particles and over 200 TB of data from a single run. Phase II activity would involve full development of SciViz2 and its dissemination to the wider community. Our close collaboration with NASA's HPC group will be heavily leveraged to test and release the software for open use.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| SciberQuest, Inc. | Lead Organization | Industry | Del Mar, California |
| Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |

| Primary U.S. Work Locations |
|---|
| California |

## Project Transitions

**February 2011:** Project Start

**September 2011:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/138351)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

SciberQuest, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Homa Karimabadi

**Co-Investigators:**

Homa Karimabadi
Homa Karimabadi

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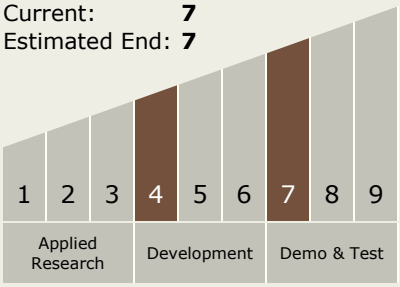
## Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**




## Technology Areas

**Primary:**

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.3 Semantic Technologies

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System